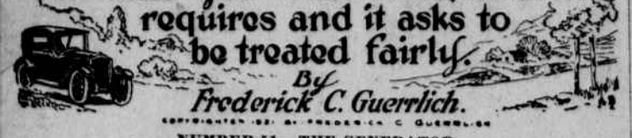
The Automobile Speaks

It tells you what it is, what it requires and it asks to be treated fairly.

By Frederick C. Guerrlich.

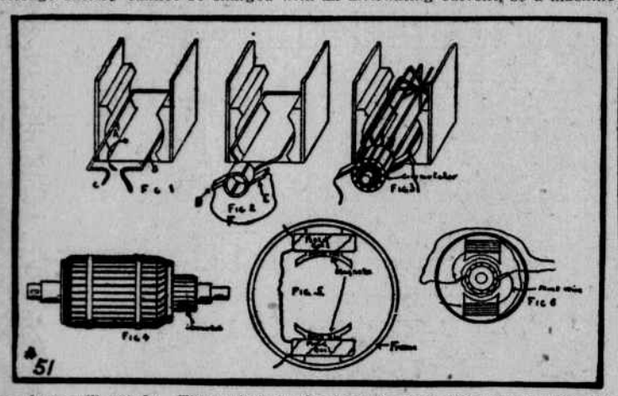


NUMBER 51.—THE GENERATOR.

In the first lesson on the magneto you were shown how, when a wire is made to cut through the magnetic field of a magnet, a current of electricity is generated in the wire. On this principle is based the design of all electrical generators.

You were also told that as the wire cuts through the magnetic field in one direction, say upward, the current will flow in one direction in the wire, while, when it cuts in the opposite direction, the current will flow in the opposite direction. Thus, in Fig. 1, the wire A will be cutting upward during one-half the revolution, and so the current will travel out of C, while during the next half-revolution A (now in the position of B) will be cutting downward, and so the current will flow in at C. When the direction of flow of the current alternates as above we say that it is an **alternating current.**

Now, the purpose of the generator is to charge a storage battery, but a storage battery cannot be charged with an alternating current, so a machine



as above will not do. Then what can be done to make the current "direct"? If each end of the wire were fastened to a half-ring, as shown in Fig. 2, the brush D, as the wire and half-rings revolve, would always be rubbing against the half-ring attached to the wire cutting upward, and the brush E to the half-ring attached to the wire cutting downward. Thus the current would always flow out (say) from the brush D and in at the brush E, and so the current in the wire F would be of **direct current,** or always flowing in one direction.

The half-rings to which the end of the wire are attached would have to be separated by some insulating material, so as to prevent the brushes catching; to give strength; and to prevent dirt, oil, &c., getting between them and causing a short circuit. As you will see later, these half-rings are reduced to small segments of circles in practice. These segments with the insulation between them are called the **commutator.**

Of course, one loop of wire as shown in Fig. 2, will not give sufficient and a steady enough voltage to be practical and so a number of loops arranged in a circle, as shown in Fig. 3, are used. Instead of attaching the ends of the loops to a large semi-circle segment, as in Fig. 2, a number of small segments are used. Sometimes each loop has its own segment, but more often a few of the adjacent loops are attached to one segment.

For mechanical reasons, and also to intensify the current generated, the loops of wire are wound on a soft iron core. This core is made up of a large number of discs, or is laminated. The core with the loops or winding is called the armature. Fig. 4 shows a complete armature with the commutator at the right.

So much for the armature. Now as to the magnets. You have had brought to your attention two kinds of magnets; namely, the permanent magnet, made of hard steel, and the electro-magnet, made of soft iron, with a coil of wire wound about it, which is a magnet only when current is flowing through the wire. The latter type of magnet is used in practically all the generators used in the starting and lighting systems of to-day.

From where can we get the current which must flow through the wire wound on this core? Why, from the armature, as shown in Fig 6. Here a wire is connected to one of the brushes, then wrapped about one core, then the other, and then returns to the second brush, while separate wires go out of the machine to the battery, lights, &c. When a portion of the current is so shunted from the main line, we say that the generator is shunt wound. The coil of wire around the magnets is called the **field coil,** as the magnetic field is due to it.

In stationary dynamos (or generators) such as used in large power plants and in some of the small generators used on the automobile, in addition to the shunt winding as explained above, the main current, before leaving the machine, is first made to flow through a few turns of wire placed on the field magnets, the field coil thus being in "series" with the outside units Where the field coil has two windings, one a shunt and the other a series, it is said to be compound wound.

Perhaps a question has come to you, namely, if the current generated by the armature is due to the armature windings cutting through the magnetic field, and if the core is a magnet only when current is flowing through its coil, then, when the machine has stopped, there will be no magnetic field, as no current will be flowing through the field coils, and so when the armature is started revolving there will be no field and so no current will be generated. This problem is taken care of by having the material of which the core is made such that once it is magnetized it will always retain a small amount of magnetism, called residual magnetism. This will yield a slight current at starting, and then this current, by flowing through the field coils, will increase the magnetism, this magnetism thus being built up until the maximum for that speed of armature revolution is reached.

In some generators instead of there being only two magnets with their coils, there are four, six, eight, &c., placed equal distances apart, in a circle, the first being a positive pole, the second negative, next positive, next negative and so on.

As the collector brushes which, by rubbing against the commutator, collect the current generated by the armature. These, while sometimes made of copper, are most always made of prepared carbon. In order to allow for wear, they are mounted in a pivoted arm or in such a way that they can slide back and forth, and are held against the commutator by means of springs.

GLEASON JOINS DURANT ORGANIZATION

M. B. Leahy, general sales manager for Durant Motor Company plants at Long Island City, Lansing, Michigan and Toronto, Ont., announced to-day the appointment of C. D. Gleason as manager of sales for the Dominion of Canada, operating from the Leaside plant at Toronto.

Mr. Gleasan goes to the Durant organization from the Chevrolet Motor Company, with which he has been identified for a number of years. For a considerable time he was a Chevrolet distributer at Winnipeg, Man., and is thoroughly familiar with the Dominion trade. Later he was located at Pittsburgh, in charge of the Pittsburgh division of sales, and more recently was transferred to Detroit, operating with the central Chevrolet staff in the latter city.

The Durant Canadian plant has been in operation since March 1.